Morgan
Advanced Materials

COMPOSITES AND
DEFENCE SYSTEMS

MORGAN ADVANCED MATERIALS



Morgan
Advanced Materials

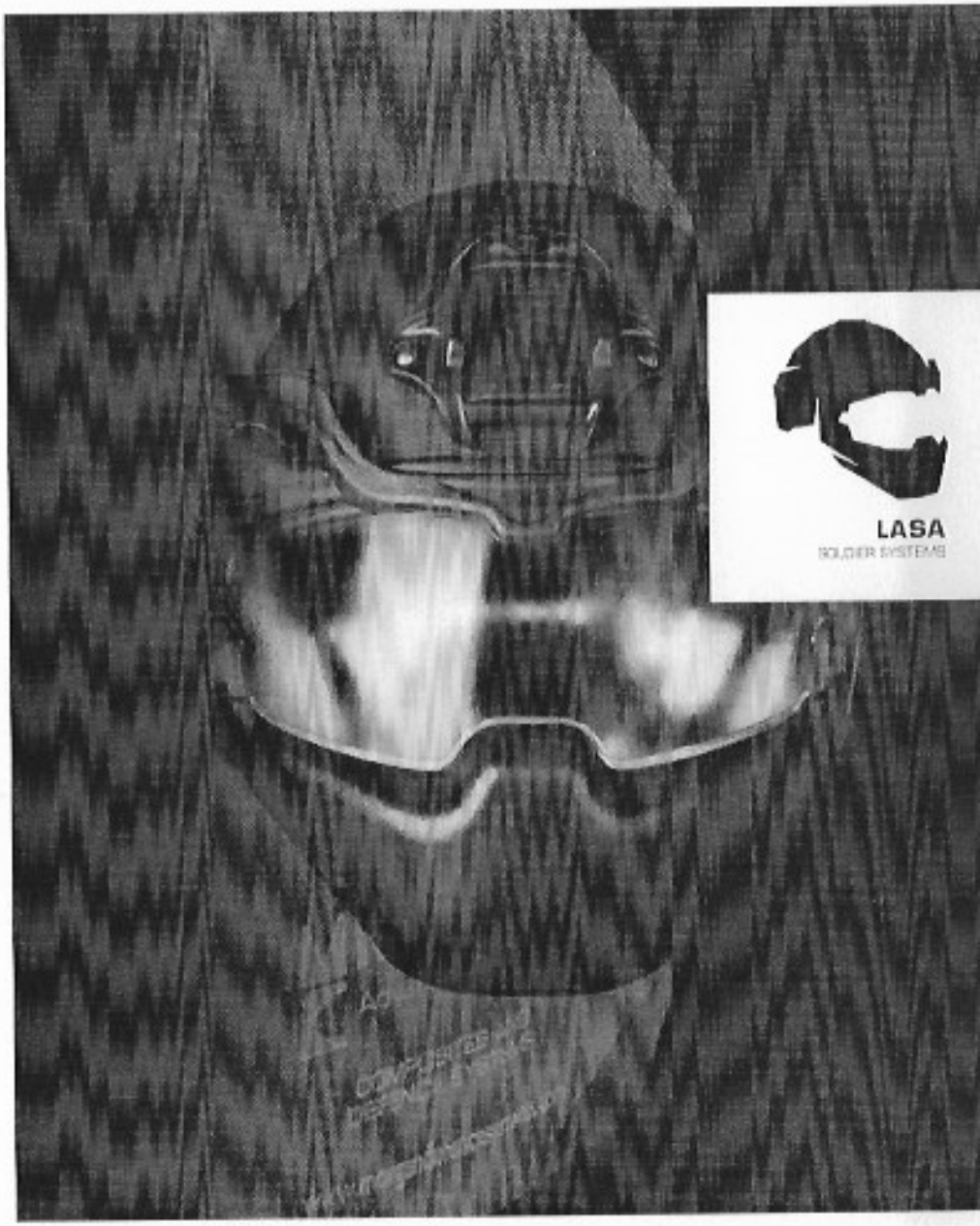
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Morgan
Advanced Materials

COMPOSITES AND
DEFENCE SYSTEMS

Morgan Advanced Materials

Morgan Advanced Materials is a global materials engineering company which designs and manufactures a wide range of high specification products with extraordinary properties, across multiple sectors and geographies.

From an extensive range of advanced materials we produce components, assemblies and systems that deliver significantly enhanced performance for our customers' products and processes. Our engineered solutions are produced to very high tolerances and many are designed for use in extreme environments.

The Company thrives on breakthrough innovation. Our materials scientists and applications engineers work in close collaboration with customers to create outstanding, highly differentiated products that perform more efficiently, more reliably and for longer.

Morgan Advanced Materials has a global presence with more than 9,000 employees across 50 countries serving specialist markets in the energy, transport, healthcare, electronics, security and defence, petrochemical and industrial sectors. It is listed on the London Stock Exchange in the engineering sector (ticker MGAM).

Composites and Defence Systems

Morgan Composites and Defence Systems, a business of Morgan Advanced Materials, specialises in advanced armour systems for personnel and platform protection.

We design and deliver personal protection solutions for the Lightweight Armoured Soldier Architecture (LASA), delivering a complete personal ballistic protection system. Combining outstanding ballistic performance with optimum comfort and low weight. Morgan products are some of the most advanced armour in the world.

The LASA helmet and body armour solutions for all military and law enforcement requirements across land and sea. A range of helmet cuts and protection options provides optimum for different environments and combat requirements. The LASA ballistic helmet inserts, developed using state-of-the-art technology, is the ideal solution for different threat levels at the lowest weight.





LASA

MISSION CRITICAL PERSONAL PROTECTION

THE LASA RANGE OF HELMETS AND BALLISTIC INSERTS DELIVERS OUTSTANDING PROTECTION TO MEET THE VARIED NEEDS OF MODERN COMBAT AND LAW ENFORCEMENT PERSONNEL



SPECIAL OPERATIONS

Combining best lightweight ballistic protection, enhanced situational awareness and comfort for enduring missions, the LASA AC915 high cut helmet with optional visor and modular attachment provides high level ballistic, fragmentation and blast injuries protection.

Accompanied with LASA LWB 8+ kit lightweight tailored ballistic inserts, weighing less than 11kg each, the special operations protection system offers lightweight protection for elite performance.



COMBAT OPERATIONS

Delivering unrivalled protection for main infantry applications, the full cut LASA AC914 provides fuller coverage than the LASA AC915 high cut helmet, integrating a NVG shroud, universal rails and a range of suspension systems. The LASA AC914 allows for the mounting of protective visor capable including cameras and torches.

Ballistic inserts for different threat levels are available. The LASA LWB IV++ kit harnesses Morgan's market-leading ceramic technology and patented Quick Response System, affording the user a level of protection exceeding the ballistic norms of NIJ Level IV. Alternatively the LASA LWB8 kit offers unrivalled protection in compliance with NIJ Level III and weighs less than 8kg.



MARITIME OPERATIONS

Designed for extreme maritime environments, the Maritime Ballistic Helmet, designed for Special Forces, Navy and Coastguard applications, provides ballistic protection against 9mm rounds and for buoyant and water resistant properties.

The buoyant LASA LWB 11+ kg ballistic insert, weighing less than 11kg provides further protection for maritime operations.



LAW ENFORCEMENT

A range of helmet and ballistic inserts are available for law enforcement applications. The LASA AC905 or LASA AC200 both provide excellent ballistic performance and can be used with a range of accessories.



LASA

WORLD LEADING LASA HELMETS

MORGAN PRODUCES A SUITE OF ADVANCED BALLISTIC LIGHTWEIGHT HELMETS TO MEET THE VARIED NEEDS OF MODERN COMBAT PERSONNEL. THE PORTFOLIO BUILDS ON DECADES OF DESIGN EXPERTISE TO DELIVER ULTRA-LIGHTWEIGHT BALLISTIC PROTECTION USING CUTTING EDGE MATERIALS.

LASA AC915



LASA AC914



HYBRID COMPOSITE HELMETS

Utilising world leading ultra-lightweight hybrid composite technology, the LASA AC915 and LASA AC914 are Morgan's lightest and most advanced helmets, providing optimum comfort and integrating with key accessories including visors, mandible guards, night vision goggles, cameras and torches.

LASA AC905



LASA AC903



LASA AC200



ARAMID HELMETS

The utilisation of aramid materials delivers outstanding ballistic performance at a low weight. The LASA AC905, LASA AC903 and LASA AC200 incorporate outstanding ballistic properties with low mass.

MARINE BALLISTIC



MARITIME HELMET

Worked in partnership with Gentex Head Gear, a major provider of advanced, forward thinking helmet systems, Morgan is proud to present its latest maritime helmet.

LASA Flight Deck



LASA Tank Crew



SPECIALIST HELMETS

Building on decades of military helmet design, Morgan designs and develops helmets for specialist applications such as tank or armoured vehicle crews and for use on a ship's flight deck.

LASA HELMET PERFORMANCE

The LASA helmet range provides solutions for varying requirements including weight, ballistic performance and price. A full helmet specification is listed in each helmet's datasheet, which can be obtained through emailing information@morganplc.com

HELMET	SHAPE	MASS (without helmet suspension)	BALLISTIC PERFORMANCE	FRAGMENT PROTECTION 17gr FSP V50	BLUNT TRAUMA PROTECTION	ROTATION	RETENTION SYSTEM	RAILS	NIJ STANDARD
Hybrid Composite Helmets									
LASA AC915	High Cut	1.07kg	9mm FMJ	685	650±68 - 300g	Positive	Ratchet dial or 4 point chinstrap	✓	✓
LASA AC914	Full Cut	1.2kg	9mm FMJ	685	650±68 - 300g	Positive	Ratchet dial or 4 point chinstrap	✓	✓
Aramid Helmets									
LASA AC905	High Cut	1.35kg	9mm FMJ	671		Positive	Ratchet dial or 4 point chinstrap	✓	✓
LASA AC903	Full Cut	1.4 kg	9mm FMJ	280	650±68 - 400g	Positive	Ratchet dial or 4 point chinstrap	N/A	✓
LASA AC207	Full Cut	1.5kg	9mm FMJ	603	650±68	Positive	3 point chinstrap	N/A	N/A
Marine Helmet									
Maritime Ballistic	Specialist cut	1.8kg	9mm FMJ			Positive	2 point chinstrap	N/A	N/A
Specialist Helmets									
LASA Tank Crew	Specialist cut	1.3kg	NA	400	650±61 - 400g	Positive	2 point chinstrap	N/A	N/A
LASA Flight Deck	Specialist cut		NA	NA	NA	Positive	2 point chinstrap	N/A	N/A

HYBRID COMPOSITE HELMETS

Constructed using world leading lightweight composite materials, Morgan's hybrid composite helmet technology enables the Morgan engineering team to optimise the helmet construction against key performance requirements such as: Fragmentation, Ballistic, Blunt Trauma, Dynamic Deflection and Survivability performance.

These individual requirements often compete when designing the lightest weight solution, for example low dynamic deflection vs high fragmentation performance. Using a carefully designed hybrid construction enables helmet solutions to be offered to meet the full requirements not at the lightest possible weight.

LASA AC915

ULTRA LIGHTWEIGHT HIGH CUT ASSAULT HELMET FOR ELITE PERFORMANCE

The LASA AC915 is Morgan's most advanced lightweight high-cut helmet. Combining world leading engineering and materials selection, the LASA AC915 delivers elite performance for special operations.

Key Features:

- Ultra lightweight hybrid composite shell construction weighing
- Protection against 9mm round (threat as per NIJ 0101.06 Level IIIA)
- Configurable suspension systems for optimum comfort
- High cut for increased situational awareness
- Rails and NVG mount integrates with in service head-mounted devices (e.g. night vision goggles, torches and communication systems)
- Optional visor and mandible guard provides high impact protection for eyes and face







PERFORMANCE STATISTICS

BALLISTIC PERFORMANCE	17gr FSP v50	>680m/s
	16gr Sphere V50	>620m/s
	9mm FMJ RTF Vpro Kit	5 rounds @ 430m/s
	BS 6638 Impact	<300G
COMPRESSION	Compression, 45 cycles at 1100N side to side and front to back	Peak deflection <25mm
	Compression, 45 cycles at 1500N top to crown	Peak deflection <14mm
	GROSS WEIGHT* (size M, with visor)	1.05kg
	ATTACHMENT OPTIONS	• Mandible guard • Camera • Full face visor • NVG • Torch
	CHINSTRAP	4 point retention system with nape pad
		4 point chinstrap with ratchet system
	SUSPENSION OPTIONS	Four impact liner with comfort pad system
	SIZES	Small, Medium, Large
	COLOURS	MultiCam®, Green Black, Pixel Blue, Alternative colours available upon request

LASA AC914

ULTRA LIGHTWEIGHT FULL-CUT HELMET FOR COMBAT OPERATIONS

The LASA AC914 is a full cut version of the LASA AC915, providing fuller coverage whilst maintaining a lightweight design and outstanding ballistic performance.

Key Features

- Ultra-lightweight hybrid composite shell construction weighing 1.3kg
- Protection against 9mm round (threat as per NIJ 0101.04 Level IIIA) and high levels of fragmentation and blunt trauma protection
- Configurable suspension systems for optimum comfort
- Rails and NVG mount integrates with in service head-mounted devices (e.g. night vision goggles, torches and communication systems)
- Optional visor and mandible guard provides high impact protection for eyes and face









PERFORMANCE STATISTICS

BALLISTIC PERFORMANCE	17gr FSP v50	>680m/s
	16gr Sphere V50	>620m/s
	9mm FMJ RTF Vpro Kit	5 rounds @ 430m/s
	BS 6638 Impact	<300G
COMPRESSION	Compression, 45 cycles at 1100N side to side and front to back	Peak deflection <15mm
	Compression, 45 cycles at 1500N top to crown	Peak deflection <3mm
	GROSS WEIGHT (size M, with visor)	1.15kg
	ATTACHMENT OPTIONS	• Mandible guard • Camera • Full face visor • NVG • Torch
	CHINSTRAP	4 point retention system with nape pad
		4 point chinstrap with ratchet system
	SUSPENSION OPTIONS	Four impact liner with comfort pad system
	SIZES	Small, Medium, Large
	COLOURS	MultiCam®, Green, Black, Pixel Blue, Alternative colours available upon request

GECKO
HEAD GEAR

MARITIME BALLISTIC HELMET

BUOYANT BALLISTIC
PROTECTION FOR
MARITIME OPERATIONS



jointly developed between Morgan Advanced Materials and Gecko Head Gear, the Maritime Ballistic Helmet, exclusively designed for marine environments, provides vital ballistic protection combined with buoyancy and water resistant properties.

Key Features

- Ballistic insert protecting against 9mm rounds
- Inflatable inner liner provides a 100% custom fit and buoyancy
- Complemented with ballistic eye protection and night vision mounts

PERFORMANCE STATISTICS	
BALLISTIC PERFORMANCE	9mm (NIJ 0101.04 IIIA)
MARINE SAFETY CERTIFICATION	MSA/SI 2002
MOUNTAINEERING HELMET CERTIFICATION	EN12492
EYE PROTECTION	BS4110 with Compatible visor
EAR DEFENCE	SNR30 (with equivalent ear plugs)
SIZE	One size with inflatable liner for custom fit (56-63cm)
COLOUR	Matt Black



ARAMID HELMETS

Constructed using advanced aramid materials, the aramid range of LASA helmets combine outstanding ballistic protection with low mass.



LASA AC905

The LASA AC905 high-cut helmet is an aramid version of the LASA AC915, although slightly heavier than the cutting edge LASA AC915, the LASA AC905 provides outstanding ballistic protection at a low weight.

PERFORMANCE STATISTICS	
BALLISTIC PERFORMANCE	7.6mm FSPV V50 @ 610 m/s 7gr FSP STO < 20 mm @ 565 m/s
BLUNT TRAUMA PROTECTION	HD Polyethylene Foam Liner
IMPACT PROTECTION	Impact Energy <25Kg deceleration
GROSS WEIGHT (without visor)	1.35kg
ATTACHMENT OPTIONS	Mandible guard
	Full Face Visor
	Torch
	Camera
	NVG
CHIN STRAP	4 point retention system with nape pad
	4 point chinstrap with ratchet system
SUSPENSION OPTIONS	Foam impact liner with comfort pad options
SIZES	Small, Medium, Large
COLOURS	MultiCam®, Green, Black or Navy Blue. Alternative colours available upon request



LASA AC903

Utilising in theatre proven technology, the LASA AC903 full-cut helm provides high level ballistic, blunt trauma and reduced thermal load protection whilst maintaining lightweight properties. The helmet consi of a high performance composite shell and integrated liner system.

PERFORMANCE STATISTICS	
BALLISTIC PERFORMANCE	416 m/sec
BLUNT TRAUMA PROTECTION	HD Polyethylene Foam Liner
IMPACT PROTECTION	Impact Energy <35Kg deceleration
GROSS WEIGHT (full helmet + mandible)	1.4kg
SIZES	4 sizes
COLOURS	MultiCam®, Green, Black or Navy Blue. Alternative colours available upon request
VISORS	Visors available for improvised explosive device and Riot Scenarios

LASA AC200

The LASA AC200 offers a low cost ballistic and fragmentation protection solution. The helmet's liner and suspension system have been optimised to allow the helmet to interface with a wide range of other personnel protection devices.



PERFORMANCE STATISTICS	
BALLISTIC PERFORMANCE	42g FSF @V50
BLUNT TRAUMA PROTECTION	HD Polyethylene Foam Liner
FRAGMENTATION PROTECTION	V_{50} = 620 m/sec
GROSS WEIGHT (FULL HELMET - MEDIUM)	1.5 kg
SIZES	3 sizes
COLOURS	NATO Green, Black or Olive Drab. Other colours available upon request

SPECIALIST HELMETS

DEVELOPED FOR OPERATIONAL APPLICATIONS, MORGAN'S SPECIALIST HELMETS HAVE BEEN DESIGNED BY INDUSTRY EXPERTS TO MEET THE VARIED NEEDS OF THE END USER.



LASA Tank Crew

The combat proven LASA Tank Crew helmet offers comfort, impact and fragmentation protection. It is also designed to interface with communications systems and a range of eye defenders.

PERFORMANCE STATISTICS	
BALLISTIC PERFORMANCE	V_{50} = 400 m/sec (1.1 g (17 gr) Fragment)
BLUNT TRAUMA PROTECTION	HD Polyethylene Foam Liner
IMPACT PROTECTION OF <400g	To EU 336 with accessories
GROSS WEIGHT (FULL HELMET - MEDIUM)	1.3 kg
SIZES	3 sizes
COLOURS	NATO Green, Black or Olive Drab



LASA Flight Deck

Designed specifically for busy flight decks, the LASA Flight Deck helmet provides hearing protection and integrates with in service communication systems. The LASA flight Deck helmet is manufactured from flame retardant fabrics providing enhanced protection.

RETENTION AND ACCESSORY OPTIONS

Morgan offers a range of retention options for optimum comfort and performance. Combat enhancements for the attaching of additional capability including night vision goggles, cameras and visors are also available.

RETENTION OPTIONS



4 Point Chinstrap

An intuitive and fully adjustable system for a secure fit.



Ratchet Dial

Utilising an adjustable dial 4 point retention system, the user benefits from a customisable fit for optimum comfort and locking adjusters for a secure fit.

COMBAT ENHANCEMENTS



Rails

Morgan's ultra-lightweight rails allow for the attachment of in service equipment including cameras and torches.



NVG Shroud

The lightweight NVG shroud allows for the attaching of night vision goggles or cameras.



Visors

A variety of visors are available for LASA helmets to meet tactical operational requirements.

	RETENTION OPTIONS		COMBAT ENHANCEMENTS		
Helmet	4 Point Chinstrap	Ratchet Dial	Rails	NVG	Visors
LASA AC915	✓	✓	✓	✓	✓
LASA AC914	✓	✓	✓	✓	✓
LASA AC905	✓	✓	✓	✓	✓
LASA AC903	✓	✓	N/A	✓	✓
MARINE BALLISTIC	N/A	N/A	N/A	N/A	N/A
LASA TANK CREW	N/A	N/A	N/A	N/A	N/A
LASA FLIGHT DECK	N/A	N/A	N/A	N/A	N/A

WORLD LEADING LASA BALLISTIC INSERTS

Morgan designs and produces a range of ballistic inserts to meet the needs of modern combat protection against a range of threat and weight requirements.

- LASA LWB III+ ic06 in conjunction ballistic insert weighs less than [illegible] against threats exceeding NIJ 0101.06 Level III
- LASA LWB III+ ic06 multi-hit capability in conjunction ballistic insert protects against threats exceeding NIJ 0101.06 Level III
- LASA LWA IV- sa04 standalone ballistic insert defeats BZ rounds and SS109 rounds
- LASA LWA IV+ ic04 in-conjunction ballistic insert delivers multi-hit protection against threat exceeding NIJ 0101.04 Level IV
- LASA LWA IV+ sa04 standalone ballistic insert delivers multi-hit protection against threat exceeding NIJ 0101.04 Level IV with patented Crack Mitigation System



LASA LWB III+ ic06

World leading ultra-lightweight protection to defeat threats beyond NIJ Level III in conjunction with approved soft armour

- Weighs 0.78kg per ballistic insert
- Buoyant and ergonomic design
- Passes testing against a range of threats in accordance with NIJ 0101.06 Level III
  (in conjunction with approved soft armour):
  - 7.62mm ball rounds (NIJ 0106 level III)
  - 7.62mm mild steel core (AK47)
  - 5.56mm ball rounds (M193 and SS109)

LASA LWA IV- sa04

Lightweight standalone protection against BZ rounds and SS109 rounds

- Weighs 1.95kg per ballistic insert
- 14mm thickness
- Standalone solution
- Passed testing against a range of threats in accordance with NIJ 0101.04 Level IV
  - 7.62mm x 39 API BZ @ 730 m/s
  - 5.56mm x 45 SS109 @ 950 m/s



LASA LWA IV+ ic04

Lightweight multi-hit protection to defeat threats beyond NIJ 0101.04 level IV in conjunction with approved soft armour incorporating patented crack mitigation technology

- Weighs 2.4kg per ballistic insert
- 19mm thickness
- Multi hit capability at NIJ 0101.04 Level IV
  (in conjunction with approved soft armour)



LASA LWA IV+ sa04

Lightweight standalone multi-hit protection to defeat threats beyond NIJ 0101.04 level IV incorporating patented crack mitigation technology

- Weighs 2.8kg per ballistic insert
- 28.5mm thickness
- Standalone solution
- Multi hit capability at NIJ 0101.04 Level IV



Morgan
Advanced Materials

COMPOSITES AND
DEFENCE SYSTEMS

The Morgan Composites and Defence Systems Defence Portfolio

SILVERBACK

An integral part of Morgan Composites and Defence Systems' personal protection is the Silverback bomb disposal suit portfolio. Through integrating leading edge materials and world class garment engineering, Morgan's Silverback bomb disposal suits combine maximum protection with class leading ergonomic performance, tested in the most extreme of environments.
The Silverback portfolio comprises of a comprehensive range of bomb disposal suits for a variety of applications.

SILVERBACK 4020 ELITE

- Outstanding protection, outstanding flexibility
- Flexible design for key bomb disposal manoeuvres such as climbing ladders or crawling
- Integrated cooling to reduce operator fatigue
- Quick release system for emergency removal
- Outstanding vision, situational awareness, reach and manoeuvrability



SILVERBACK 3010

- Protection for search operations in [illegible]
- Lightweight and flexible
- Further enhancement with cooling, ventilation and communications [illegible]



SILVERBACK 2010

- Protective apron with optional arms and leg covers for enhanced protection
- Apron is adjustable in two positions for a customised fit
- Backless design for comfort through unrestricted airflow



CAMAC
PLATFORM ARMOUR

Utilising world leading composite armour technology, CAMAC™ Platform Armour provides [illegible] level protection for land, sea and air platforms at up to 50% less weight than equivalent steel solutions. Morgan has extensive engineering capability to design complex customised composite armour solutions to the specific requirements of our customers.
Our combat proven armour systems are tailored to the requirements of the threat, the individual platform and its operational duties.

CAMAC® SPALL LINER

- Improved crew and platform survivability through the mitigation of behind armour effects
- Increased coverage, reduced fixing points and reduced assembly time
- Enhanced protection when combined with CAMAC® Applique or Structural Armour



CAMAC® APPLIQUE ARMOUR

- For new platforms and upgrades
- Light weight multi-hit protection solutions for STANAG 4569 Levels 2-4a
- Up to 50% lighter than equivalent steel solution
- Patented encapsulation system for maximum protection, multi-hit capability and reduced mass



CAMAC® SEMI-STRUCTURAL ARMOUR

- Protective apron with optional arms and leg covers for enhanced protection
- Apron is adjustable in two positions for a customised fit
- Backless design for comfort through unrestricted airflow



CAMAC® COMPOSITE SURVIVABILITY CAPSULES

- Morgan has more expertise in composite survivability capsules than any other company in the world
- Key weight reduction enables up to 50% lighter than equivalent steel solution
- Custom designed to integrate with unique platform requirements
- Field upgradable armour via modular CAMAC® applique packages to provide outstanding protection against evolving threats

